

WHAT IS CLAIMED IS:

- 1 1. An isolated and purified banana DNA molecule, said DNA molecule
2 being differentially expressed during banana fruit development.
- 1 2. A DNA molecule according to claim 1, wherein said DNA molecule
2 encodes a protein selected from the group consisting of a starch synthase, a
3 granule-bound starch synthase, a chitinase, an endochitinase, a beta-1,3
glucanase, a thaumatin-like protein, an ascorbate peroxidase, a metallothionein, a
5 lectin, and another senescence-related protein.
- 1 3. A DNA molecule according to claim 1, selected from the group
2 consisting of clones pBAN 3-33, pBAN 3-18, pBAN 3-30, pBAN 3-24, pBAN 1-
3 3, pBAN 3-28, pBAN 3-25, pBAN 3-6, pBAN 3-23, pBAN 3-32, and pBAN 3-46.
- 1 4. A DNA molecule according to claim 1, wherein said DNA molecule
2 has the nucleotide sequence selected from the group consisting of SEQ ID NO: 1,
3 SEQ ID NO: 2, and SEQ ID NO: 3.
- 1 5. A DNA molecule according to claim 1, wherein said DNA molecule
2 encodes a protein having an amino acid sequence selected from the group
3 consisting of SEQ ID NO: 4, SEQ ID NO: 5, SEQ ID NO: 6, the DNA sequence
4 shown in Figure 16, the DNA sequence shown in Figure 17, the DNA sequence
5 shown in Figure 18, and the DNA sequence shown in Figure 19.
- 1 6. A chimeric gene comprising a DNA molecule which is differentially
2 expressed during banana fruit development operably linked to a heterologous
3 promoter.

1 8. A plant genome, comprising the chimeric gene of claim 6.

1 9. A plant cell, comprising the chimeric gene of claim 6.

1 10. A plant comprising the chimeric gene of claim 6, wherein said
2 chimeric gene is stably integrated into the plant genome.

1 11. An isolated and purified banana protein which is differentially
2 produced in developing banana fruit.

1 12. A protein according to claim 11, wherein said protein is a selected
2 from the group consisting of a starch synthase, a granule-bound starch synthase, a
3 chitinase, an endochitinase, a beta-1,3 glucanase, a thaumatin-like protein, an
4 ascorbate peroxidase, a metallothionein, a lectin, and another senescence-related
5 protein.

1 13. A protein according to claim 11, wherein said protein is encoded by
2 a DNA molecule selected from the group consisting of clones pBAN 3-33, pBAN
3 3-18, pBAN 3-30, pBAN 3-24, pBAN 1-3, pBAN 3-28, pBAN 3-25, pBAN 3-6,
4 pBAN 3-23, pBAN 3-32, and pBAN 3-46.

1 14. A protein according to claim 11, wherein said protein has an amino
2 acid sequence selected from the group consisting of SEQ ID NO: 4, SEQ ID NO:
3 5, SEQ ID NO: 6, the amino acid sequence shown in Figure 16, the amino acid
4 sequence shown in Figure 17, the amino acid sequence shown in Figure 18, and
5 the amino acid sequence shown in Figure 19.

1 15. A composition comprising the protein of claim 11 and a carrier
2 therefor.

1 16. A plant cell comprising the protein of claim 11.

1 17. An isolated and purified banana DNA regulatory element which is 5'
2 or 3' to a gene which is differentially expressed during fruit development.

1 18. A regulatory element according to claim 17, wherein said regulatory
2 element is activated by an ethylene signal.

1 19 A regulatory element according to claim 18, wherein the ethylene
2 signal is produced by developing fruit.

1 20. A regulatory element according to claim 18, wherein the ethylene
2 signal is produced by exogenous ethylene gas.

1 21. A chimeric gene comprising a banana DNA regulatory element
2 operably linked to a heterologous DNA molecule, wherein said regulatory element
3 is naturally found, or is derived from a sequence naturally found, 5' or 3' to a gene
4 which is differentially expressed during fruit development.

1 22. A plant genome comprising a chimeric gene according to claim 21.

1 23. A plant cell transformed with a chimeric gene according to claim
2 21.

1 24. A plant comprising a chimeric gene according to claim 21, wherein
2 said chimeric gene is stably integrated into the plant genome.

1 25. A method for expression of heterologous protein in fruit comprising
2 transforming fruiting plants with a chimeric gene according to claim 21, exposing
3 said fruit to an plant development signal, and harvesting fruit containing said
4 heterologous protein.

1 26. The method of claim 25, wherein the plant development signal is
2 ethylene gas produced by ripening fruit.

1 27. The method of claim 25, wherein the plant development signal is
2 exogenous ethylene gas.

1 28. The method of claim 25, further comprising the step of isolating the
2 heterologous proteins from the harvested fruit.

1 29. The method of claim 25, wherein the heterologous protein is a
2 therapeutic protein.

1 30. A fruit produced by the method of claim 25.

1 31. The fruit of claim 30, wherein said fruit is a banana.

1 32. A protein produced by the method of claim 25.

1 33. A protein produced by the method of claim 28.

1 34. A plant comprising a chimeric gene according to claim 24, wherein
2 said plant is a monocot.

1 35. A plant comprising a chimeric gene according to claim 34, wherein
2 said monocot is a banana plant.

1 36. A plant comprising a chimeric gene according to claim 24, wherein
2 said plant is a dicot.

1 37. A plant comprising a chimeric gene according to claim 36, wherein
2 said dicot is a tomato plant.

1 38. The fruit of claim 30, wherein said fruit is a tomato.

1 39. A regulatory element according to claim 17, wherein said regulatory
2 element is a 5' upstream promoter region of the p31 gene.

1 40. A regulatory element according to claim 39, wherein said regulatory
2 element has the nucleotide sequence of SEQ ID NO:44 or is a fragment thereof.

1 41. A regulatory element according to claim 39, wherein said 5'
2 upstream region of the p31 gene has the nucleotide sequence of SEQ ID NO: 45 or
3 is a fragment thereof.

1 42. A chimeric gene according to claim 21, wherein said regulatory
2 element is a 5' upstream promoter region of the p31 gene.

1 43. A chimeric gene according to claim 21, wherein said regulatory
2 element has the nucleotide sequence of SEQ ID NO: 44 or is a fragment thereof.

1 44. A chimeric gene according to claim 21, wherein said regulatory
2 element has the nucleotide sequence of SEQ ID NO: 45 or is a fragment thereof.